

REMARKS

In view of the above amendments and the following remarks, reconsideration of the objections and rejections contained in the Office Action of December 23, 2003 is respectfully requested.

As an initial matter, the substitute specification filed on November 8, 2002 has been amended as indicated above to provide antecedent basis for new claim language used in the above-amended claims. These changes are merely formal in nature, and no new matter has been added. Thus, the Examiner is respectfully requested to enter the changes to the specification.

The Examiner has objected to the drawings because Figure 8 requires a legend such as "Prior Art." Therefore, Figure 8 has now been amended to include the required legend, and new formal Figure 8 (which includes this amendment) is submitted herewith. In view of the submission of new formal Figure 8, it is respectfully submitted that the Examiner's objections to the drawings has been overcome.

The Examiner has rejected claims 30 and 32 as being clearly anticipated by the Furukawa reference, and has rejected claim 31 as being unpatentable over the Furukawa reference in view of the Matsunaga reference. In this regard, the Examiner is requested to note that claims 30-32 have been cancelled as indicated above. Consequently, it is submitted that the Examiner's prior art rejections of claims 30-32 are no longer applicable.

The Examiner has rejected claims 27 and 28 as being unpatentable over the Kawai reference (JP 403008561); and has rejected claim 29 as being unpatentable over the Kawai reference in view of the Katagiri reference (JP 401014595). In view of these rejections, an interview was conducted with the Examiner on March 11, 2004 to discuss independent claim 27 and the applied prior art references. In view of the Interview, independent claim 27 has now been amended as indicated above to further clarify the distinctions between the present invention and the prior art, and new dependent claims 39-44 have been added. For the reasons discussed below, it is submitted that amended independent claim 27 and the claims that depend therefrom are clearly patentable over the prior art of record.

As explained to the Examiner during the Interview of March 11th, the present invention as recited in claim 27 was developed in view of several problems in the prior art. Firstly, it was determined that forming a plate heat exchanger by *pressing* a plurality of plates to form openings through the plates is an extremely efficient manner of producing heat exchangers (see paragraph [0088] of the substitute specification). Unfortunately, the pressing operation might form burrs on the exit side of the opening (although, as explained to the Examiner during the Interview, the burrs are not *necessarily* formed). If burrs are formed, then it is possible that the burrs will damage the jigs or the tools used to apply solder to the surface of the plates. In addition, the burrs may cause large gaps between adjacent plates, particularly if a burred surface of a plate faces a burred surface of an adjacent plate.

The present invention as recited in amended independent claim 27 comprises shaping plates by *pressing*, and thus includes further features that have been developed to address the potential problems caused by burrs that might be formed during pressing. In particular, amended independent claim 27 further comprises pressing against a *first* surface of each of the plates toward a *second* surface of each of the plates. Solder paste is coated on the *first* surface of each of the plates, and the plates are stacked *immediately adjacent to each other* so that the second surface of each plate does not adjoin the second surface of an adjacent plate. The plates are also heated while holding the plates in close contact with each other.

The embodiment recited in amended independent claim 27 is described on page 19, paragraph [0088] through page 22, paragraph [0099] of the substitute specification, and is illustrated in Figure 7. Because the plates are stacked *immediately adjacent to each other* so that the second surface of each plate does not adjoin the second surface of an adjacent plate, burr-to-burr contact is avoided so as to minimize or eliminate gaps formed between adjacent plates (see paragraph [0092]). Furthermore, because the solder paste is applied to the first surface (i.e., the surface pressed against to form the openings, which is much less likely to include burrs or jagged edges), damage to jigs or tools during application of the solder is avoided (see paragraph [0099]).

The Kawai reference discloses a method of manufacturing a laminate-type heat exchanger, including arranging a cooling medium plate 10 between seal plates 11, 11. During the Interview of

March 11th, the Examiner indicated that Figure 5 appears to disclose burrs 8 formed in plates 4. However, an English-language translation of the portion of the Kawai reference discussing plates 4, 5 and the embodiment illustrated in Figures 4 and 5 was not available. Consequently, the Applicants have now prepared a verified English translation of the portions of the Kawai reference pertaining to the embodiment illustrated in Figure 5, and the translation is submitted herewith.

This portion of the Kawai reference explains that refrigerant plates 4 are shaped by pressing to form through-holes with burrs 8, and sealing plates 5 are interposed between refrigerant plates 4. The Kawai reference does not, however, disclose how the plates 5 are formed. Moreover, the fact that burrs 8 are shown on plates 4 which *are* described as being shaped by pressing, but that burrs 8 are not shown to be formed on the sealing plates 5 at least *suggests* that the plates 5 are not formed by pressing. Consequently, it is submitted that the Kawai reference does not disclose or even suggest a method comprising shaping a plurality of plates by pressing to form openings through each of the plates, and stacking the plates (i.e., the plates formed by pressing) *immediately adjacent to each other*, as recited in amended independent claim 27.

Furthermore, the Examiner's statement on page 5 of the Office Action that "[t]here is no novelty in applying the brazing material on one side versus the other side of the plate" is respectfully traversed. To the extent that the Examiner means that there is no *advantage* in applying the brazing material on one side versus the other side of the plate, the Examiner's attention is directed to the section above describing the advantages of this feature. Moreover, although the Examiner notes that the Kawai reference teaches that a single layer of soldering material 9 is provided between plates 4 and 5, this reference does not disclose or even suggest *coating* solder paste on the *first surface* of each of the plates (i.e., the surface that is pressed so as to form the openings), as also recited in amended independent claim 27.

The Examiner asserts that the Katagiri reference discloses a heat exchanger comprising plates 12, 13, in which an adhesive material is applied to the plates via a silkscreen or print mask. However, the Katagiri reference also does not disclose or suggest shaping a plurality of plates by pressing against a first surface of each of the plates, coating solder paste on the first surface of each of the plates, and stacking the plates immediately adjacent to each other as recited in amended independent claim 27. Therefore, one of ordinary skill in the art would not be motivated by the Katagiri reference to modify the Kawai reference so as to obtain the invention as recited in amended

independent claim 27. Accordingly, it is respectfully submitted that amended independent claim 27 and the claims that depend therefrom are clearly patentable over the prior art of record.

In the Office Action, the Examiner indicated that claims 21 and 23-26 are allowed. Thus, in view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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